

Prenatal Development Timeline

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| ■ Nervous | ■ Cardiovascular | ■ Muscular | ■ Early Events |
| ■ Special Senses | ■ Respiratory | ■ Skeletal | ■ Growth Parameters |
| ■ Blood & Immune | ■ Gastrointestinal | ■ Endocrine | ■ General |
| ■ Skin/Integument | ■ Renal/Urinary | ■ Reproductive | ■ Movement |

Unit 1: The First Week

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| <p>Day 0 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Embryonic period begins</p> |
| | <p>■ Fertilization resulting in zygote formation</p> |
| <p>Day 1 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Embryo is spherically shaped and called a morula comprised of 12 to 16 blastomeres</p> |
| | <p>■ Embryo is spherically shaped with 12 to 16 cells</p> |
| <p>Day 1 - Day 1 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Fertilization - development begins with a single-cell embryo!!!</p> |
| | <p>■ Early pregnancy factor (EPF)</p> |
| <p>Day 2 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Activation of the genome</p> |
| | <p>■ Blastomeres begin rapidly dividing</p> |
| | <p>■ Zygote divides into two blastomeres (24 - 30 hours from start of fertilization)</p> |
| <p>Day 3 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Compaction</p> |
| | <p>■ Embryonic disc</p> |
| <p>Day 4 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Free floating blastocyst</p> |
| | <p>■ Hypoblast & epiblast</p> |
| | <p>■ Inner cell mass</p> |
| | <p>■ See where the back and chest will be</p> |
| <p>Day 5 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Hatching blastocyst</p> |
| | <p>■ Embryo attaches to wall of uterus</p> |
| <p>Day 6 $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Solid syncytiotrophoblast & cytotrophoblast</p> |
| | <p>■ Chorion</p> |
| <p>1 week $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>■ Chorionic cavity</p> |
| | <p>■ Extra-embryonic mesoderm (or mesoblast)</p> |
| | <p>■ Placenta begins to form</p> |

Unit 2: 1 to 2 Weeks

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| <p>1 week, 1 day $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Amnioblasts present; amnion and amniotic cavity formation begins</p> |
| | <p>Bilaminar embryonic disc</p> |
| <p>1 week, 2 days $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Positive pregnancy test</p> |
| | <p>Corpus luteum of pregnancy</p> |
| | <p>Cells in womb engorged with nutrients</p> |
| | <p>Exocoelomic membrane</p> |
| | <p>Isolated trophoblastic lacunae</p> |
| | <p>Embryonic disc 0.1 mm diameter</p> |
| <p>1 week, 4 days $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Intercommunicating lacunae network</p> |
| | <p>Longitudinal axis</p> |
| | <p>Prechordal plate</p> |
| | <p>Trophoblastic vascular circle</p> |
| <p>1 week, 5 days $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Implantation complete</p> |
| | <p>Yolk sac</p> |
| | <p>Embryonic disc diameter: 0.15 to 0.20 mm</p> |
| <p>1 week, 6 days $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Blood islands in umbilical vesicle</p> |
| | <p>Angiogenesis in chorionic mesoblast</p> |
| | <p>Blood vessels in villi</p> |
| | <p>Connecting stalk</p> |
| | <p>Primordial blood vessels</p> |
| | <p>Amnion with single cell layer</p> |
| | <p>Chorionic villi</p> |
| <p>2 weeks $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Embryonic epiblast gives rise to primitive streak and primitive node and</p> |
| | <p>Yolk sac</p> |
| | <p>Yolk sac</p> |

Unit 3: 2 to 3 Weeks

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| <p>2 weeks, 1 day $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>3 germ layers</p> |
| | <p>Cloacal membrane</p> |
| | <p>Primitive groove</p> |
| <p>2 weeks, 2 days $\frac{1}{2}$ $\frac{1}{2}$</p> | <p>Rostral-caudal orientation</p> |
| | <p>Erythroblasts in yolk sac</p> |

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| | <ul style="list-style-type: none"> Three types of blood-forming cells in yolk sac |
| | <ul style="list-style-type: none"> Primordial germ cells |
| | <ul style="list-style-type: none"> Allantoic diverticulum |
| | <ul style="list-style-type: none"> Allantoic diverticulum |
| | <ul style="list-style-type: none"> Amnion with two cell layers |
| | <ul style="list-style-type: none"> Notochordal process |
| | <ul style="list-style-type: none"> Secondary villi |
| 2 weeks, 4 days $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Foregut, midgut, and hindgut |
| | <ul style="list-style-type: none"> Uteroplacental circulation well established |
| | <ul style="list-style-type: none"> Prechordal plate with 1 retinal field |
| | <ul style="list-style-type: none"> Brain is first organ to appear |
| | <ul style="list-style-type: none"> Caudal eminence |
| | <ul style="list-style-type: none"> Neural ectoderm |
| | <ul style="list-style-type: none"> Neural groove and neural folds |
| | <ul style="list-style-type: none"> Neural plate induced by notochordal process |
| | <ul style="list-style-type: none"> Notochordal and neurenteric canals |
| | <ul style="list-style-type: none"> Notochordal plate |
| | <ul style="list-style-type: none"> Connecting stalk |
| | <ul style="list-style-type: none"> Primitive pit (or notochordal pit) |
| 2 weeks, 5 days $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Prechordal plate with 2 retinal fields |
| 2 weeks, 6 days $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Numerous blood islands in umbilical vesicle |
| | <ul style="list-style-type: none"> Septum transversum (primitive diaphragm) |
| | <ul style="list-style-type: none"> Foregut |
| | <ul style="list-style-type: none"> Oropharyngeal membrane |
| | <ul style="list-style-type: none"> Pharyngeal pouch 1 |
| | <ul style="list-style-type: none"> Stomodeum forming |
| | <ul style="list-style-type: none"> Beginnings of the heart can be seen |
| | <ul style="list-style-type: none"> Blood vessels emerge simultaneously in umbilical vesicle, embryo proper, amnion, and connecting stalk |
| | <ul style="list-style-type: none"> Common umbilical artery |
| | <ul style="list-style-type: none"> Dorsal aortae (paired) |
| | <ul style="list-style-type: none"> First pair of aortic arches |
| | <ul style="list-style-type: none"> Heart: Cardiogenic plate, cardiac jelly, myocardial mantle, and endocardial plexus |
| | <ul style="list-style-type: none"> Left ventricle, right ventricle, conotruncus |
| | <ul style="list-style-type: none"> Paired pericardial cavities |
| | <ul style="list-style-type: none"> Paired tubular heart |
| | <ul style="list-style-type: none"> Forebrain, midbrain, and hindbrain |
| | <ul style="list-style-type: none"> Hindbrain with four rhombomeres |
| | <ul style="list-style-type: none"> Isthmus rhombencephali demarcates midbrain and hindbrain |

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| | ■ Mesencephalon (or midbrain) |
| | ■ Neural cord within caudal eminence |
| | ■ Neural groove deepens substantially |
| | ■ Primary neuromeres |
| | ■ Three main divisions of brain |
| | ■ Cephalic and caudal folds |
| | ■ Neural crest: Rostral and facial |
| | ■ Primitive streak reaches neurenteric canal |
| | ■ Somites with central somitocoels: Pairs 1 through 3 |
| 3 weeks $\ddot{\zeta} \ddot{\zeta}$ $\frac{1}{2} \frac{1}{2}$ | ■ Blood and blood vessels |

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| Unit 4: 3 to 4 Weeks | |
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| 3 weeks, 1 day $\ddot{\zeta} \ddot{\zeta}$ $\frac{1}{2} \frac{1}{2}$ | ■ Thyroid primordium emerges from floor of pharynx |
| | ■ Nephrogenic cord emerges (at 10 somites) |
| | ■ Cloaca |
| | ■ Common coelomic cavity divides into peritoneal, pericardial, and pleural cavities |
| | ■ Liver: Hepatic plate (endoderm) |
| | ■ Midgut emerging |
| | ■ Pharyngeal arches 1 and 2 |
| | ■ Pharyngeal cleft 1 |
| | ■ Second pharyngeal cleft and pouch |
| | ■ Pharyngeal groove and ridge with laryngotracheal sulcus |
| | ■ Respiratory outgrowth |
| | ■ Atria (right and left) far apart |
| | ■ Bulbis cordis |
| | ■ Circulatory system function begins |
| | ■ Endocardial tubes fuse forming tubular heart |
| | ■ Heart begins beating |
| | ■ Pericardial sac |
| | ■ Pericardium |
| | ■ Primary head vein |
| | ■ Sinus venosus |
| | ■ Tubular heart begins folding |
| | ■ Umbilical arteries |
| | ■ Umbilical veins (right and left) |
| | ■ Optic primordia fill neuromere D2 |
| | ■ Otic pits |
| | ■ Chiasmatic plate |
| | ■ Mesencephalic flexure |
| | ■ Neural tube |
| | ■ Neuromeres D1 and D2 (in diencephalon) |

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| | ■ Optic sulcus in forebrain |
| | ■ Pontine region identifiable near cranial nerves VII and VIII |
| | ■ Segment D in rhombencephalon |
| | ■ Some secondary neuromeres |
| | ■ Superior colliculus |
| | ■ Telencephalon |
| | ■ Telencephalon (or telencephalic) medium |
| | ■ Body cavities |
| | ■ Hyoid arch |
| | ■ Mandibular arch and maxillary process |
| | ■ Neural crest: Trigeminal, facioacoustic, glossopharyngeal-vagal, and occipitospinal |
| | ■ Somites: Pairs 4 through 12 |
| 3 weeks, 3 days $\frac{1}{2}$ $\frac{1}{2}$ | ■ Primordial germ cells begin moving from umbilical vesicle to hindgut |
| | ■ Thyroid complete |
| | ■ Face: Maxillary and mandibular processes (bilaterally) |
| | ■ Cloacal membrane |
| | ■ Mesonephric duct emerges from nephrogenic cord |
| | ■ Nephric vesicles |
| | ■ Cystic primordium |
| | ■ Hepatic diverticulum |
| | ■ Liver |
| | ■ Membrane between future mouth and throat may begin to rupture |
| | ■ Angiogenesis along surface of central nervous system |
| | ■ Aortic sac |
| | ■ Atrioventricular canal |
| | ■ Capillary plexus begins forming around brain and spinal cord |
| | ■ Conotruncus |
| | ■ Conus cordis emerging from right ventricle |
| | ■ Endocardium |
| | ■ Heart contractions produce peristaltic blood flow |
| | ■ Internal carotid arteries |
| | ■ Interventricular septum |
| | ■ Primordium of myocardium |
| | ■ Sinus venosus separating from left atria |
| | ■ Trabeculated outpouches along primary cardiac tube representing primordia of left and right ventricles |
| | ■ Trigeminal and otic arteries |
| | ■ Facio-vestibulocochlear ganglia (CN VII, CN VIII) |
| | ■ Glossopharyngeal and vagal ganglia |
| | ■ Optic evagination (starting at 14 somites) |

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| | <ul style="list-style-type: none"> Otic vesicle |
| | <ul style="list-style-type: none"> Trigeminal ganglia (CN V) |
| | <ul style="list-style-type: none"> Neural crest: Optic crest emerges during Carnegie Stages 11 and 12 |
| | <ul style="list-style-type: none"> Nose: Nasal plate |
| | <ul style="list-style-type: none"> Optic vesicles form (17 to 19 somites) |
| | <ul style="list-style-type: none"> Adenohypophysial pouch |
| | <ul style="list-style-type: none"> Adenohypophysis |
| | <ul style="list-style-type: none"> Lamina terminalis |
| | <ul style="list-style-type: none"> Mesencephalon contains tectum and tegmentum |
| | <ul style="list-style-type: none"> Neural crest production and migration continue |
| | <ul style="list-style-type: none"> Neurohypophysial primordia |
| | <ul style="list-style-type: none"> Neuropore (near brain) closes |
| | <ul style="list-style-type: none"> Notochord |
| | <ul style="list-style-type: none"> Segmentation of mesoblast alongside neural tube bilaterally |
| | <ul style="list-style-type: none"> Somites: Pairs 13 through 20 |
| <p>3 weeks, 3 days - 5 weeks, 6 1/2 days</p> | <ul style="list-style-type: none"> All eight rhombomeres (Rh 1 through Rh 7, Rh D) - Present in stages 11 through 17 |
| <p>3 weeks, 5 days</p> | <ul style="list-style-type: none"> Telopharyngeal bodies |
| | <ul style="list-style-type: none"> Alimentary epithelium invades stroma of liver |
| | <ul style="list-style-type: none"> Alimentary epithelium proliferates in primordia of stomach, liver, and dorsal pancreas |
| | <ul style="list-style-type: none"> First part of pancreas |
| | <ul style="list-style-type: none"> Gastric portion of foregut elongates (25 to 28 somites) |
| | <ul style="list-style-type: none"> Hepatic primordium with abundant vascular plexus |
| | <ul style="list-style-type: none"> Omental bursa |
| | <ul style="list-style-type: none"> Oropharyngeal membrane is ruptured |
| | <ul style="list-style-type: none"> Pharyngeal arch 3 |
| | <ul style="list-style-type: none"> Pharyngeal arches with dorsal and ventral parts |
| | <ul style="list-style-type: none"> Umbilical vesicle elongates |
| | <ul style="list-style-type: none"> Cervical sinus |
| | <ul style="list-style-type: none"> Laryngotracheal groove |
| | <ul style="list-style-type: none"> Lung bud |
| | <ul style="list-style-type: none"> Tracheo-esophageal septum |
| | <ul style="list-style-type: none"> Atrioventricular canal |
| | <ul style="list-style-type: none"> Common cardinal veins (right and left) |
| | <ul style="list-style-type: none"> Descending aorta |
| | <ul style="list-style-type: none"> Heart circulates blood to and from central nervous system, umbilical vesicle, and chorion |
| | <ul style="list-style-type: none"> Hepatocardiac channels (right and left) |
| | <ul style="list-style-type: none"> Rostral and caudal cardinal veins along brain and spinal cord feeding common cardinal veins |

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| | <ul style="list-style-type: none"> Septum primum and foramen primum sometimes present |
| | <ul style="list-style-type: none"> Septum primum, foramen primum |
| | <ul style="list-style-type: none"> Sinu-atrial foramen prevents backflow into sinus venosus |
| | <ul style="list-style-type: none"> Sinus venosus collects venous blood from entire embryo |
| | <ul style="list-style-type: none"> Superior vena cava, inferior vena cava, and sinus venosus collecting all venous blood |
| | <ul style="list-style-type: none"> Unidirectional circulation |
| | <ul style="list-style-type: none"> Vitelline arteries and veins |
| | <ul style="list-style-type: none"> Hypoglossal cord (CN XII) enters pharyngeal arch 4 |
| | <ul style="list-style-type: none"> Otocyst nearly closed |
| | <ul style="list-style-type: none"> Nasal discs form part of ectodermal ring |
| | <ul style="list-style-type: none"> Optic vesicles covered by sheath (formed by mesencephalic and optic crest) |
| | <ul style="list-style-type: none"> Brain involves 40% of neural tube |
| | <ul style="list-style-type: none"> Brain: Embryonic commissural plate |
| | <ul style="list-style-type: none"> Ectodermal ring complete |
| | <ul style="list-style-type: none"> Hypoglossal nucleus (CN XII) |
| | <ul style="list-style-type: none"> Lowermost spinal cord formation begins |
| | <ul style="list-style-type: none"> Mamillary recess |
| | <ul style="list-style-type: none"> Marginal layer in rhombencephalon |
| | <ul style="list-style-type: none"> Mesencephalic flexure at 90 degrees |
| | <ul style="list-style-type: none"> Mesencephalon with two neuromeres: M1 and M2 |
| | <ul style="list-style-type: none"> Motor neurons in basal plate of rhombencephalon |
| | <ul style="list-style-type: none"> Neural tube closes (lower back) |
| | <ul style="list-style-type: none"> Neurofibrils form in rhombencephalon |
| | <ul style="list-style-type: none"> Primary neurulation ends |
| | <ul style="list-style-type: none"> Primordia of ventral thalamus and subthalamus in diencephalon |
| | <ul style="list-style-type: none"> Sulcus limitans |
| | <ul style="list-style-type: none"> Sulcus limitans in midbrain |
| | <ul style="list-style-type: none"> Somites: Pairs 21 through 29 |
| | <ul style="list-style-type: none"> Upper limb primordium at level of somites 8 to 10 |
| | <ul style="list-style-type: none"> Progressively C-shaped embryo |
| 4 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Spleen primordia |
| | <ul style="list-style-type: none"> Thymic primordia |
| | <ul style="list-style-type: none"> Lower lip forms from merging of mandibular processes |
| | <ul style="list-style-type: none"> Melanoblasts in epidermis |
| | <ul style="list-style-type: none"> Skin is so thin, you can see through it! |
| | <ul style="list-style-type: none"> Gonadal ridge extends from C-7 to T-8 levels |
| | <ul style="list-style-type: none"> Primordial germ cells migrate to mesonephric ridges |
| | <ul style="list-style-type: none"> Primordial germ cells number several hundred |
| | <ul style="list-style-type: none"> Urorectal septum |

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| | Thyroid bilobed and attached to pharynx by thyroglossal duct |
| | Diaphragm primordia |
| | Glomeruli emerge in mesonephros |
| | Mesonephric duct attached to cloaca |
| | Nephric tubules now S-shaped |
| | Urogenital sinus |
| | Urorectal cleavage line |
| | Diverticulum ilei marks division between foregut and hindgut |
| | Esophagus primordia |
| | Intestines growing in length |
| | Mesentery from end of duodenum to proximal half of colon |
| | Opening between gut and umbilical vesicle decreases |
| | Pancreas: Ventral pancreas |
| | Pharyngeal pouches 1 through 4 |
| | Pharynx |
| | Pleuroperitoneal canals |
| | Small & large intestines |
| | Stalk of umbilical vesicle lengthens and narrows |
| | Stomach assumes shape of a spindle |
| | Umbilical vesicle at height of development |
| | Vitelline duct |
| | Bronchial buds |
| | Lungs begin filling chest cavity |
| | Mesenchyme from coelomic epithelium surrounds esophagus and lung buds |
| | Trachea |
| | Anterior, middle, and posterior cerebral plexuses |
| | Aorta branches include dorsal intersegmental, lateral segmental, and ventral segmental arteries |
| | Aortic arches 4 and 6 |
| | Artery from the common iliac artery feeds each lower limb bud |
| | Atrioventricular bundle |
| | Cardiac contractions still under myogenic control |
| | Celiac artery, superior and inferior mesenteric arteries |
| | Circulatory system "well established" |
| | Common iliac arteries (right and left, from dorsal aorta bifurcation) |
| | Contractions well coordinated and sequential from sinus venosus to atria to ventricles |
| | Functioning two-chamber heart |
| | Gas exchange through placenta begins |
| | Gelatinous reticulum (or cardiac mesenchyme) |
| | Heart chambers bulging with fluid |

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| | Heart now functions as two parallel pumps |
| | Heart rate (about) 113 beats/min |
| | Heart: Atrioventricular cushions (rostromventral and caudodorsal) |
| | Heart: Myocardium wall 3 to 4 cells thick |
| | Primary head veins (right and left) drain anterior, middle, and posterior cerebral plexuses and feed precardinal veins |
| | Small arteries emerging throughout mesoderm |
| | Ventricle walls trabeculated |
| | Vertebral arteries |
| | Vitelline veins empty exclusively into hepatic plexus |
| | Most cranial nerve ganglia |
| | Trigeminal, glossopharyngeal, and vagal preganglia |
| | Basement membrane of otic disc surrounds otic vesicle |
| | Endolymphatic appendage |
| | Otic invagination |
| | Otic vesicle closes |
| | Terminal-vomeronasal neural crest |
| | Brain: Commissural plate |
| | Cerebellum |
| | Common afferent tract |
| | Fourth ventricle |
| | Interstitial nucleus (part of medial longitudinal fasciculus) |
| | Isthmus rhombencephali (a new neuromere) |
| | Oculomotor (CN III) and trochlear nuclei (CN IV) in mesencephalon (midbrain) and isthmus respectively |
| | Retinal and lens discs |
| | Amnion surrounds connecting stalk and vitelline stalk |
| | Amnion surrounds embryo |
| | Cervical flexure |
| | Hyoid arch subdivides into dorsal and ventral segments |
| | Limb buds - the first sign of arms and legs |
| | Lower limb buds |
| | Umbilical cord emerging |
| | Upper and lower limb buds |

Unit 5: 4 to 5 Weeks

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| 4 weeks, 3 days $\frac{1}{2}$ $\frac{1}{2}$ | Early eyes |
| 4 weeks, 3 days - 5 weeks $\frac{1}{2}$ $\frac{1}{2}$ | Germ cells migrate to gonads |
| 4 weeks, 4 days $\frac{1}{2}$ $\frac{1}{2}$ | Thymus |

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| | Parathyrogenic zones |
| | Thyroglossal duct |
| | Thyroid pedicel lengthens |
| | Dorsal contour develops depression at level of sclerotomes 4 and 5 |
| | Muscular plates between upper and lower limb buds |
| | Glomerular capsules, partially vascularized |
| | Mesonephric corpuscle |
| | Metanephrogenic cap emerges from ureteric bud |
| | Ureteric buds |
| | Angiogenesis within peri-esophageal mesenchyme |
| | Epiploic foramen |
| | Lesser sac (omental bursa) |
| | Small intestine forming coils |
| | Tongue: Hypopharyngeal eminence |
| | Arytenoid swellings (right and left) |
| | Capillary network surrounds pulmonary mesenchyme |
| | Epithelial lamina of larynx |
| | Lungs: Right and left primary (or main stem) bronchi |
| | Mesenchyme covering esophagus and respiratory tree separates |
| | Mesenchyme surrounds bronchi |
| | Pleura (mesothelium) surrounds part of mesenchyme |
| | Right main bronchus longer than left |
| | Atria walls thin, ventricle walls thick and trabeculated |
| | Atrioventricular cushions not fused |
| | Common pulmonary vein drains pulmonary plexuses into left atrium |
| | Conotruncal ridges or cushions (remnants of cardiac jelly) |
| | Epicardium |
| | Left subclavian artery feeds left axillary artery, left vertebral artery, and left thyrocervical trunk |
| | Outflow tract still with one lumen |
| | Posterior communicating arteries |
| | Pulmonary arch (sixth aortic arch) forms from aorta and aortic sac |
| | Pulmonary capillary network fed by pulmonary arteries, drain into left atrium |
| | Sino-atrial (SA) node |
| | Superior mesenteric artery and vein |
| | Upper limb buds with early marginal blood vessel |
| | Brachial plexus |
| | Cervical plexus |
| | Dorsal roots |
| | Hypoglossal nerve roots unite (CN XII) |

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| | ■ Lens and retina invaginate to form optic cup |
| | ■ Primordium of cochlear duct |
| | ■ Rami communicantes |
| | ■ Spinal nerves reach muscle primordia |
| | ■ Upper limb buds innervated |
| | ■ External ear: Auricular hillocks merging |
| | ■ Eyes located on sides of head |
| | ■ Lens pits |
| | ■ Lens vesicle open to surface (lens pore) |
| | ■ Nose: Nasal pits |
| | ■ Nose: Nasal plate (or disc) flat or concave |
| | ■ Pigment in retina (external layer of optic cup) |
| | ■ D1 and D2 no longer identifiable within diencephalon |
| | ■ 75% of midbrain covered by marginal layer |
| | ■ All 16 secondary neuromeres |
| | ■ Brain enlarges 50% since Carnegie Stage 13 |
| | ■ Brain: Cerebral hemispheres appear and begin rapid growth |
| | ■ Brain: Lateral ventricles |
| | ■ Cerebellum with intermediate and ventricular layers |
| | ■ Cerebellum: Primordium found in alar plate of rhombomere 1 |
| | ■ Corpora striata primordia connected by commissural plate |
| | ■ Cranial nerve 3 |
| | ■ Di-telencephalic sulcus |
| | ■ Dorsal and ventral thalami |
| | ■ Dorsal funiculus |
| | ■ Hypothalamic sulcus |
| | ■ Hypothalamus |
| | ■ Mamillary region |
| | ■ Medial and lateral longitudinal fasciculi |
| | ■ Median ventricular eminence |
| | ■ Pontine flexure |
| | ■ Preoptic sulcus extends between optic evaginations |
| | ■ Preoptico-hypothalamo-tegmental tract |
| | ■ Primary meninx surrounds most of brain |
| | ■ Rhombic lip |
| | ■ Spinal cord wall with three zones: ventricular (ependymal) zone, mantle (intermediate) zone, and marginal zone |
| | ■ Subthalamus with medial striatal ridge emerging |
| | ■ Synencephalon |
| | ■ Tegmentum |
| | ■ Tentorium cerebelli, medial portion |

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| | <ul style="list-style-type: none"> Terminal-vomeronasal crest contacts brain (olfactory area) |
| | <ul style="list-style-type: none"> Torus hemisphericus (TH) |
| | <ul style="list-style-type: none"> Velum transversum |
| | <ul style="list-style-type: none"> Ventral longitudinal fasciculus |
| | <ul style="list-style-type: none"> Ventral segment of hyoid arch subdivides |
| 4 weeks, 5 days | <ul style="list-style-type: none"> Primordium of antitragus emerges from ventral subsegment of hyoid arch |
| ½ | <ul style="list-style-type: none"> Gonad framework found in coelomic epithelium |
| ½ | <ul style="list-style-type: none"> Thyroid detached from epithelium of pharynx in some embryos |
| | <ul style="list-style-type: none"> Lower limb bud rounded proximally and tapered distally |
| | <ul style="list-style-type: none"> Mesenchymal skeleton in upper and lower limbs |
| | <ul style="list-style-type: none"> Right and left neural processes |
| | <ul style="list-style-type: none"> Sclerotomic material around notochord (rhombomere D level) |
| | <ul style="list-style-type: none"> Vertebrae well defined |
| | <ul style="list-style-type: none"> Vertebral centra |
| | <ul style="list-style-type: none"> Primary urogenital sinus |
| | <ul style="list-style-type: none"> Ureteric bud extends to pelvis of the ureter |
| | <ul style="list-style-type: none"> Bladder and rectum are separating caudal to ureters |
| | <ul style="list-style-type: none"> Caecum |
| | <ul style="list-style-type: none"> Dense mesenchyme surrounds much of gastrointestinal tract |
| | <ul style="list-style-type: none"> Esophagus elongates, passes dorsal to carina and between main stem bronchi |
| | <ul style="list-style-type: none"> Gall bladder and cystic duct |
| | <ul style="list-style-type: none"> Liver: Hepatic ducts |
| | <ul style="list-style-type: none"> Ventral pancreas appears as an offshoot of the cystic duct |
| | <ul style="list-style-type: none"> Lobar bud swellings denote areas of secondary bronchi |
| | <ul style="list-style-type: none"> Remnants of coelomic epithelium forming visceral pleura |
| | <ul style="list-style-type: none"> Atrioventricular cushions apposed |
| | <ul style="list-style-type: none"> Blood flow divided into right and left streams through atrioventricular canal, ventricles, outflow tract, and aortic sac |
| | <ul style="list-style-type: none"> Blood vessels penetrate diencephalon |
| | <ul style="list-style-type: none"> Capillary plexus surrounds esophagus |
| | <ul style="list-style-type: none"> Capillary plexus surrounds lung buds |
| | <ul style="list-style-type: none"> Cardiac mesenchyme surrounds ventricles and outflow tract |
| | <ul style="list-style-type: none"> Coronary arteries (terminal end) |
| | <ul style="list-style-type: none"> Foramen secundum begins in septum primum |
| | <ul style="list-style-type: none"> Left ventricle with thicker walls and greater volume than right |

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| | <ul style="list-style-type: none"> ■ Right subclavian artery originates from brachiocephalic artery and feeds right thyrocervical trunk and axillary and vertebral arteries |
| | <ul style="list-style-type: none"> ■ Semilunar cusps |
| | <ul style="list-style-type: none"> ■ Capsule present around lens |
| | <ul style="list-style-type: none"> ■ Corneal epithelium overlying optic cup |
| | <ul style="list-style-type: none"> ■ Ear: Endolymphatic duct |
| | <ul style="list-style-type: none"> ■ Genuiculate and vestibulocochlear ganglia separating |
| | <ul style="list-style-type: none"> ■ Lens body now present containing some lens fibers |
| | <ul style="list-style-type: none"> ■ Lower limb buds innervated |
| | <ul style="list-style-type: none"> ■ Optic stalk |
| | <ul style="list-style-type: none"> ■ Utricle, endolymphatic duct, and endolymphatic sac |
| | <ul style="list-style-type: none"> ■ Utriculo-endolymphatic fold |
| | <ul style="list-style-type: none"> ■ External ear primordia emerges from caudolateral portion of mandibular arch |
| | <ul style="list-style-type: none"> ■ Face: Lateral and medial nasal processes bilaterally |
| | <ul style="list-style-type: none"> ■ Lateral nasal processes along dorsolateral lip of nasal pits |
| | <ul style="list-style-type: none"> ■ Lens vesicles closed, pores absent |
| | <ul style="list-style-type: none"> ■ Nose: Nasal discs recede forming nasal pits |
| | <ul style="list-style-type: none"> ■ Optic chiasm |
| | <ul style="list-style-type: none"> ■ Adult lamina terminalis |
| | <ul style="list-style-type: none"> ■ Amygdaloid area |
| | <ul style="list-style-type: none"> ■ Brain with five main sections |
| | <ul style="list-style-type: none"> ■ Cerebellar plate |
| | <ul style="list-style-type: none"> ■ Cerebellum with marginal layer |
| | <ul style="list-style-type: none"> ■ Fibers of dorsal funiculus reach level of C1 |
| | <ul style="list-style-type: none"> ■ First axodendritic synapses in cervical spinal cord |
| | <ul style="list-style-type: none"> ■ First nerve fibers |
| | <ul style="list-style-type: none"> ■ Habenular nucleus |
| | <ul style="list-style-type: none"> ■ Habenulo-interpeduncular tract |
| | <ul style="list-style-type: none"> ■ Lateral striatal ridge (derived from telencephalon and comprised mainly of neostriatum) |
| | <ul style="list-style-type: none"> ■ Lateral ventricular eminence |
| | <ul style="list-style-type: none"> ■ Locus caeruleus |
| | <ul style="list-style-type: none"> ■ Longitudinal zones in diencephalon |
| | <ul style="list-style-type: none"> ■ Marginal layer throughout most of diencephalon |
| | <ul style="list-style-type: none"> ■ Material for sympathetic trunks scattered in cervical region |
| | <ul style="list-style-type: none"> ■ Median striatal ridge (paleostriatum) |
| | <ul style="list-style-type: none"> ■ Mesencephalic tract of CN 5 |
| | <ul style="list-style-type: none"> ■ Most cranial nerves seen |
| | <ul style="list-style-type: none"> ■ Olfactory fibers reach brain |
| | <ul style="list-style-type: none"> ■ Optic groove (also called preoptic recess) |
| | <ul style="list-style-type: none"> ■ Postoptic recess |
| | <ul style="list-style-type: none"> ■ Primordium of epiphysis |

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| | ■ Rhombomeres still identifiable |
| | ■ Superior colliculi and its commissure |
| | ■ Superior medullary velum |
| | ■ Supramamillary commissure |
| | ■ Synapses among motor neurons in spinal cord |
| | ■ Tectobulbar tract |
| | ■ Tentorium |
| | ■ Third ventricle |
| | ■ Trigemino-cerebellar tract |
| | ■ Trochlear nerve root and decussation (CN IV) |
| | ■ Hand plate emerges from distal upper limb bud |
| | □ Frontonasal prominence |
| 5 weeks $\ddot{\zeta} \ddot{\zeta}$ $\frac{1}{2} \frac{1}{2}$ | ■ ACTH [adrenocorticotropin hormone] |
| | ■ Growth hormone |
| | ■ Pituitary gland |
| | □ Limb buds form hand plates |
| | ■ Permanent kidneys |
| | ■ Arytenoid and epiglottal swellings |
| | ■ Bronchial tree branching accelerates |
| | ■ Lobar pattern mimics adult pattern |
| | ■ T-shaped laryngeal inlet |
| | ■ Pacemaker cells |
| | □ Head is one third of entire embryo |

Unit 6: 5 to 6 Weeks

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| 5 weeks, 1 day $\ddot{\zeta} \ddot{\zeta}$ $\frac{1}{2} \frac{1}{2}$ | □ Wrist joints are forming |
| 5 weeks, 2 days $\ddot{\zeta} \ddot{\zeta}$ $\frac{1}{2} \frac{1}{2}$ | ■ Apical epidermal ridges |
| | ■ Mammary ridge |
| | ■ Maxillary and premaxillary fields still widely separated |
| | ■ Nipples emerge from mammary crest |
| | ■ Gonad region separates from mesonephros |
| | ■ Gonadal primordium |
| | ■ Labioscrotal swelling |
| | ■ Urogenital fold and groove |
| | ■ Suprarenal gland: Cortex primordium |
| | ■ Suprarenal gland: Medulla |
| | ■ Thyroid detaches from pharynx |
| | ■ Thyroid with right and left lobes connected by an isthmus |
| | □ Cartilage in mandibular arch |

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| | <ul style="list-style-type: none"> □ Hand area with central carpal region and digital plate with marginal vein |
| | <ul style="list-style-type: none"> □ Pre-chondrocranium: Otic capsule, nasal capsule, and parachordal condensations |
| | <ul style="list-style-type: none"> □ Primordia of primary palate |
| | <ul style="list-style-type: none"> □ Ribs: Primordia now present for all 12 pairs |
| | <ul style="list-style-type: none"> □ Vertebral column with 36 levels of ganglia and myotomes |
| | <ul style="list-style-type: none"> ■ Extra-ocular premuscle masses receive cranial nerve fibers [oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves] |
| | <ul style="list-style-type: none"> ■ Gluteal mesoderm |
| | <ul style="list-style-type: none"> ■ Infrahyoid premuscle masses |
| | <ul style="list-style-type: none"> ■ Limb mesoderm |
| | <ul style="list-style-type: none"> ■ Sternocleidomastoid-trapezius premuscle mass with spinal accessory nerve (CN11) |
| | <ul style="list-style-type: none"> ■ Thigh and thigh mesoderm |
| | <ul style="list-style-type: none"> ■ Tongue premuscle mass |
| | <ul style="list-style-type: none"> ■ Metanephros at level of sacrum |
| | <ul style="list-style-type: none"> ■ Urethral plate |
| | <ul style="list-style-type: none"> ■ Lesser omentum (ventral mesogastrun) |
| | <ul style="list-style-type: none"> ■ Peritoneal cavity |
| | <ul style="list-style-type: none"> ■ Rectum |
| | <ul style="list-style-type: none"> ■ Stomach: Greater and lesser curvatures |
| | <ul style="list-style-type: none"> ■ Yolk stalk disappears |
| | <ul style="list-style-type: none"> ■ Bronchial tree expanding |
| | <ul style="list-style-type: none"> ■ Cervical sinus diminished in size |
| | <ul style="list-style-type: none"> ■ Epiglottis |
| | <ul style="list-style-type: none"> ■ Primitive Larynx |
| | <ul style="list-style-type: none"> ■ Anterior, middle, and posterior cerebral arteries |
| | <ul style="list-style-type: none"> ■ Atrioventricular (AV) node |
| | <ul style="list-style-type: none"> ■ Atrioventricular cushions fuse with interventricular septum |
| | <ul style="list-style-type: none"> ■ Circle of Willis almost complete |
| | <ul style="list-style-type: none"> ■ Conotruncal septum |
| | <ul style="list-style-type: none"> ■ Endocardial cushions (rostroventral and caudodorsal) begin fusing around atrioventricular canal forming right and left atrioventricular canals and two separate blood streams |
| | <ul style="list-style-type: none"> ■ External carotid artery |
| | <ul style="list-style-type: none"> ■ Foramen primum disappearing |
| | <ul style="list-style-type: none"> ■ Hepatic portal vein |
| | <ul style="list-style-type: none"> ■ Infundibulum of right ventricle |
| | <ul style="list-style-type: none"> ■ Jugular lymph sac |
| | <ul style="list-style-type: none"> ■ Lateral atrioventricular cushions |
| | <ul style="list-style-type: none"> ■ Mesencephalic artery |
| | <ul style="list-style-type: none"> ■ Myelencephalic artery |

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| | Peridental blood vessels |
| | Primitive cavernous sinus drains primitive maxillary and supraorbital veins |
| | Primitive renal plexus |
| | Right ventricle feeds sixth (pulmonary) aortic arches; left ventricle feeds fourth aortic arches |
| | Semilunar valves (aortic and pulmonary) are forming |
| | Ventricles each with three parts: inlet, trabecular pouch, and outflow tract |
| | Ventricles enlarge and deepen side-by-side forming an ever growing interventricular septum |
| | Celiac plexus |
| | Cochlear nerve present |
| | Femoral and obturator nerves innervate rostralateral part of lower limb |
| | Hypoglossal nerve (CN XII) reaches tongue |
| | Intercostal nerves |
| | Lumbar and sacral plexuses |
| | Musculocutaneous, radial, ulna, and median nerves enter upper limb bud |
| | Nasal pits face more ventrally, still widely separated |
| | Nasofrontal groove |
| | Olfactory fibers connect nasal pits with brain |
| | Olfactory fibers enter brain |
| | Olfactory tubercle present |
| | Peroneal and tibial nerves innervate caudomedial part of lower limb |
| | Phrenic nerve |
| | Pigment in retina visible externally |
| | Primordium of cochlear pouch |
| | Tibial nerve innervates foot area |
| | Auricular hillocks on hyoid arch (antitragus and helix) |
| | Auricular hillocks on mandibular arch (tragus and crus) |
| | Blind nasal sac |
| | Nasal fin |
| | Alar lamina emerging with dense rhombic lip |
| | All cranial nerves identifiable |
| | Archipallium, paleopallium, and neopallium |
| | Area epithelialis |
| | Brain: Primordial plexiform layer in area of future temporal lobe |
| | Cajal-Retzius cells |
| | Commissure of the trochlear nerve |
| | Diencephalic subthalamic nucleus |
| | Dorsal and ventral thalami separated by groove |
| | Dorsal funiculus fibers reach medulla oblongata |
| | Epiphysis cerebri |

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| | <ul style="list-style-type: none"> Glial cells identifiable adjacent to neurons |
| | <ul style="list-style-type: none"> Greater petrosal nerve |
| | <ul style="list-style-type: none"> Hippocampus: Gyrus dentatus |
| | <ul style="list-style-type: none"> Infundibular recess and infundibulum |
| | <ul style="list-style-type: none"> Interventricular foramen large |
| | <ul style="list-style-type: none"> Marginal ridge |
| | <ul style="list-style-type: none"> Medial and lateral ridges of corpus striatum are continuous |
| | <ul style="list-style-type: none"> Median forebrain bundle |
| | <ul style="list-style-type: none"> Neurohypophysial outgrowth |
| | <ul style="list-style-type: none"> Olfactory tubercle |
| | <ul style="list-style-type: none"> Pontine flexure deepens |
| | <ul style="list-style-type: none"> Posterior commissure |
| | <ul style="list-style-type: none"> Recurrent laryngeal nerve |
| | <ul style="list-style-type: none"> Reticular formation more defined |
| | <ul style="list-style-type: none"> Retinal fissure closes |
| | <ul style="list-style-type: none"> Splanchnic nerve |
| | <ul style="list-style-type: none"> Sulcus limitans hippocampi |
| | <ul style="list-style-type: none"> Superior laryngeal nerve |
| | <ul style="list-style-type: none"> Second pharyngeal arch more prominent |
| | <ul style="list-style-type: none"> Third pharyngeal arch recedes |
| <p>5½ weeks</p> | <ul style="list-style-type: none"> Initial tooth formation |
| <p>5½ weeks - 6 weeks</p> | <ul style="list-style-type: none"> Subtle movement begins |
| <p>5 weeks, 4 days</p> | <ul style="list-style-type: none"> Cartilage formation |
| <p>5 weeks, 5 days</p> | <ul style="list-style-type: none"> Nerve cells differentiating |
| <p>5 weeks, 5 days - 7 weeks, 1 day</p> | <ul style="list-style-type: none"> Melanocytes in epidermis |
| <p>5 weeks, 6 days</p> | <ul style="list-style-type: none"> Facial growth centers grow and begin merging forming nose and upper jaw |
| | <ul style="list-style-type: none"> Genital eminence forms phallus or genital tubercle |
| | <ul style="list-style-type: none"> Gonad grows into oval shape with irregular surface |
| | <ul style="list-style-type: none"> Auditory ossicles identifiable in mesenchyme |
| | <ul style="list-style-type: none"> Cartilage in occipital sclerotomes (1-4) |
| | <ul style="list-style-type: none"> Digital rays in hand plate |
| | <ul style="list-style-type: none"> Femur: Chondrification begins |
| | <ul style="list-style-type: none"> Foot with rounded digital plate |
| | <ul style="list-style-type: none"> Hypoglossal foramen (or canal) through sclerotome 4 (area of future occipital bone) |

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| | <ul style="list-style-type: none"> Odontogenic epithelium emerges in six areas (four maxillary and two mandibular) |
| | <ul style="list-style-type: none"> Primary palate components (right and left) fuse in midline |
| | <ul style="list-style-type: none"> Primitive palatine groove |
| | <ul style="list-style-type: none"> Primordium of cartilage within nasal septum |
| | <ul style="list-style-type: none"> Vertebral centra begin chondrification |
| | <ul style="list-style-type: none"> Primordia of orbital muscles |
| | <ul style="list-style-type: none"> Calices |
| | <ul style="list-style-type: none"> Mesonephros can produce urine |
| | <ul style="list-style-type: none"> Pelvis of the ureter with three main divisions |
| | <ul style="list-style-type: none"> Vesico-urethral canal |
| | <ul style="list-style-type: none"> Biliary ducts within liver |
| | <ul style="list-style-type: none"> Dorsal and ventral pancreas fuse but retain separate ducts |
| | <ul style="list-style-type: none"> Duodenum enlarges proximal to and distal to bile and pancreatic ducts |
| | <ul style="list-style-type: none"> Esophagus developing a submucous coat surrounding epithelium |
| | <ul style="list-style-type: none"> Intestinal loop begins umbilical herniation |
| | <ul style="list-style-type: none"> Primordial vermiform appendix |
| | <ul style="list-style-type: none"> Stomach regions include gastric canal, fundus, corpus (or body), and pyloric antrum |
| | <ul style="list-style-type: none"> Trachea: Precursors of tracheal cartilages |
| | <ul style="list-style-type: none"> Condensing mesenchyme around junction between left and right atria and cardiac tube is precursor to mitral and tricuspid valves |
| | <ul style="list-style-type: none"> Outflow tract rotates counterclockwise |
| | <ul style="list-style-type: none"> Right and left atrioventricular canals totally separated |
| | <ul style="list-style-type: none"> All parasympathetic cranial nerve ganglia identifiable |
| | <ul style="list-style-type: none"> All spinal nerves present |
| | <ul style="list-style-type: none"> Cell islands in olfactory tubercle |
| | <ul style="list-style-type: none"> Crescentic lens cavity |
| | <ul style="list-style-type: none"> Geniculate ganglion separate from vestibulocochlear nerve |
| | <ul style="list-style-type: none"> Globular process emerges from each medial nasal process |
| | <ul style="list-style-type: none"> Nasal fin connecting nasal disc and surface epithelium |
| | <ul style="list-style-type: none"> Nasofrontal grooves |
| | <ul style="list-style-type: none"> Olfactory tubercle with cellular islands |
| | <ul style="list-style-type: none"> Hyomandibular groove enlarges (onset of concha and external auditory meatus formation) |
| | <ul style="list-style-type: none"> Medial rims of nasal pits form nasal septum |
| | <ul style="list-style-type: none"> Nostril becomes continuous with nasal sac |
| | <ul style="list-style-type: none"> Primary lens fibers |
| | <ul style="list-style-type: none"> Retinal fissure closed |
| | <ul style="list-style-type: none"> Capillaries between adenohypophysis and hypothalamus |

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| | ■ Commissure of the oculomotor nerves |
| | ■ Cortical nucleus in amygdaloid body |
| | ■ Dentate and isthmic nuclei in cerebellum |
| | ■ Dura begins forming in basal area |
| | ■ Epiphysis cerebri with intermediate layer |
| | ■ First hint of septal nucleus |
| | ■ Frontal and temporal poles of cerebral hemispheres |
| | ■ Gustatory fibers separate from common afferent tract |
| | ■ Hemispheric stalk |
| | ■ Intermediate layer in tectum mesencephali |
| | ■ Interventricular foramen |
| | ■ Mesencephalon with intermediate layer |
| | ■ Somites: Pairs 38 and 39 |
| | ■ Spinal cord reaches caudal tip of body |
| | ■ Subarachnoid space |
| | ■ Synapses in spinal cord between interneurons and primary afferent neurons |
| | ■ Ventral thalamus with intermediate layer |
| | ■ Anterior choroid artery |
| 6 weeks $\ddot{\imath}\ddot{\imath}$ $\frac{1}{2}\frac{1}{2}$ | ■ Face withdraws from light touch around mouth |
| | ■ Blood forming in liver |
| | ■ Milk lines |
| | ■ Nipples along side of trunk |
| | ■ Adrenal glands |
| | ■ Glucagon in pancreas |
| | ■ Handplates develop subtle flattening |
| | ■ Joints |
| | ■ Medial skull cartilages: Parachordal, hypophyseal, and trabecular |
| | ■ Tooth buds (primary teeth) |
| | ■ Diaphragm is largely formed |
| | ■ Intestines fill base of umbilical cord |
| | ■ External ears |
| | ■ Synapses form in spinal cord |
| | ■ Crown-heel length 1.6 cm |
| Unit 7: 6 to 7 Weeks | |
| 6 weeks, 2 days $\ddot{\imath}\ddot{\imath}$ $\frac{1}{2}\frac{1}{2}$ | ■ Angiogenesis begins inside gonads |
| | ■ Gonad grows into oval shape with irregular surface |
| | ■ Ostium (abdominal) of uterine tube at rostral end of paramesonephric duct (in female embryos) |
| | ■ Paramesonephric duct forms from rostral end of mesonephric duct |

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| | <input checked="" type="checkbox"/> Testicular cords in gonads of male embryos |
| | <input checked="" type="checkbox"/> Testicular cords in male gonad |
| | <input type="checkbox"/> Elbow regions sometimes identifiable |
| | <input type="checkbox"/> Embryo with cervical and lumbar flexures |
| | <input type="checkbox"/> Embryo with dorsal concavity |
| | <input type="checkbox"/> Finger rays with early interdigital notching |
| | <input type="checkbox"/> Hands polygon-shaped |
| | <input type="checkbox"/> Humerus, radius, and ulna |
| | <input type="checkbox"/> Humerus: Chondrocytes in phases one through three |
| | <input type="checkbox"/> Scapula and clavicle |
| | <input type="checkbox"/> Semicircular ducts form in order: anterior, posterior, and lateral |
| | <input type="checkbox"/> Sternum: Episternal cartilage created from fusion of right and left sternal bars |
| | <input type="checkbox"/> Tibia and fibula |
| | <input type="checkbox"/> Toe rays sometimes present |
| | <input checked="" type="checkbox"/> Deltoid muscle |
| | <input checked="" type="checkbox"/> External and internal abdominal oblique muscles |
| | <input checked="" type="checkbox"/> Levator scapulae muscle |
| | <input checked="" type="checkbox"/> Longus cervicis and semispinalis cervicis muscles |
| | <input checked="" type="checkbox"/> Pectoralis major muscles |
| | <input checked="" type="checkbox"/> Platysma muscle |
| | <input checked="" type="checkbox"/> Rectus abdominis muscle |
| | <input checked="" type="checkbox"/> Rectus capitis posterior and semispinalis capitis muscles |
| | <input checked="" type="checkbox"/> Serratus anterior muscles |
| | <input checked="" type="checkbox"/> Splenius and longissimus muscles |
| | <input checked="" type="checkbox"/> Stapedius muscle |
| | <input checked="" type="checkbox"/> "Common excretory duct is disappearing" |
| | <input checked="" type="checkbox"/> Cloacal membrane ruptures (stages 18-19) |
| | <input checked="" type="checkbox"/> Primordia of secretory tubules |
| | <input checked="" type="checkbox"/> Esophagus with muscular and submucous coats |
| | <input checked="" type="checkbox"/> Submandibular gland primordia |
| | <input checked="" type="checkbox"/> Bronchial tree with subsegmental buds |
| | <input checked="" type="checkbox"/> Bronchial tree with well established segmental bronchi |
| | <input checked="" type="checkbox"/> Lingula of left upper lobe |
| | <input checked="" type="checkbox"/> Aortic and pulmonary valves assuming shape of a cup |
| | <input checked="" type="checkbox"/> Brachiocephalic veins, right and left |
| | <input checked="" type="checkbox"/> Inferior vena cava |
| | <input checked="" type="checkbox"/> Interventricular septum: membranous part begins forming |
| | <input checked="" type="checkbox"/> Left coronary artery arises from aorta |
| | <input checked="" type="checkbox"/> Mesenchyme ridges in place of future mitral and tricuspid valves |
| | <input checked="" type="checkbox"/> Pulmonary and aortic blood flows completely separate |

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| | <ul style="list-style-type: none"> ■ Secondary interventricular foramen sometimes closing (stage 18-21) interventricular septum |
| | <ul style="list-style-type: none"> ■ Septum secundum and foramen ovale (stages 18-21) |
| | <ul style="list-style-type: none"> ■ Bucconasal membrane |
| | <ul style="list-style-type: none"> ■ Bucconasal membrane detaches opening up nasal airway |
| | <ul style="list-style-type: none"> ■ Crus commune |
| | <ul style="list-style-type: none"> ■ Ethmoidal epithelium emerges from upper medial nasal wall |
| | <ul style="list-style-type: none"> ■ Frontonasal angle (marks location of future nasal bridge) |
| | <ul style="list-style-type: none"> ■ Mesenchyme thickenings mark beginning of "sclera and its muscular attachments" |
| | <ul style="list-style-type: none"> ■ Nasal tip emerges |
| | <ul style="list-style-type: none"> ■ Nerve fibers in retina |
| | <ul style="list-style-type: none"> ■ Optic fibers |
| | <ul style="list-style-type: none"> ■ Retina's outer lamina heavily pigmented |
| | <ul style="list-style-type: none"> ■ Vomeronasal nerve and ganglion |
| | <ul style="list-style-type: none"> ■ Vomeronasal organ marked by groove and located in fold of lower medial nasal wall |
| | <ul style="list-style-type: none"> ■ Choanae |
| | <ul style="list-style-type: none"> ■ Conjunctival sac marked by groove |
| | <ul style="list-style-type: none"> ■ Cornea and conjunctiva |
| | <ul style="list-style-type: none"> ■ Ear: Stapes primordium surrounds stapedia artery |
| | <ul style="list-style-type: none"> ■ External ear: Crus helices forming from auricular hillocks two and three (from mandibular arch) |
| | <ul style="list-style-type: none"> ■ Eyelid folds sometimes present |
| | <ul style="list-style-type: none"> ■ Nasal fin splits forming choanae and bucconasal membrane |
| | <ul style="list-style-type: none"> ■ Nasolacrimal duct begins as epithelial strand emanating from nasomaxillary groove |
| | <ul style="list-style-type: none"> ■ Nostrils, nasal wings, and nasal septum easily seen |
| | <ul style="list-style-type: none"> ■ Olfactory bulb sometimes with olfactory ventricle |
| | <ul style="list-style-type: none"> ■ Primary lens fibers filling lens vesicle cavity |
| | <ul style="list-style-type: none"> ■ Adenohypophysis no longer open to pharyngeal cavity |
| | <ul style="list-style-type: none"> ■ Archistriatum |
| | <ul style="list-style-type: none"> ■ Brain: Dentate nucleus in internal cerebellar swellings |
| | <ul style="list-style-type: none"> ■ Brain: Pineal recess emerges representing anterior lobe of epiphysis |
| | <ul style="list-style-type: none"> ■ Brainwave activity has begun |
| | <ul style="list-style-type: none"> ■ Cerebrospinal fluid production begins |
| | <ul style="list-style-type: none"> ■ Choroid plexuses in fourth and lateral ventricles |
| | <ul style="list-style-type: none"> ■ Corpus striatum much larger extending to preoptic sulcus; has subtle groove |
| | <ul style="list-style-type: none"> ■ External cerebellar swellings contain future flocculus |
| | <ul style="list-style-type: none"> ■ Four amygdaloid nuclei |
| | <ul style="list-style-type: none"> ■ Fourth ventricle: Choroid folds |

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| | <ul style="list-style-type: none"> Hippocampus reaches olfactory region Interpeduncular fossa |
| | <ul style="list-style-type: none"> Neurohypophysis walls are folded Nucleus ambiguus of the vagus (CN10) |
| | <ul style="list-style-type: none"> Prosencephalic septum Red nucleus |
| | <ul style="list-style-type: none"> Substantia nigra Supra-optic commissure |
| 6½ weeks | <ul style="list-style-type: none"> The hands begin to move |
| ½ | <ul style="list-style-type: none"> Volar pads on palms |
| 6 weeks, 5 days | <ul style="list-style-type: none"> Bones first form in the collar bones and lower jaw Greater thymic bud |
| ½ | <ul style="list-style-type: none"> Cheeks form by merging of maxillary and mandibular processes Mammary gland primordium Mammary ridge disappears leaving only mammary gland primordium Female duct Gonads extend from levels T-10 to L-2 Rete ovarii (in female embryos) Rete testis begins emerging from seminiferous cords (Stage 19-23) (in male embryos) Tunica albuginea in male embryos Suprarenal gland: Cortex Suprarenal gland: Medulla populated by prechromaffin cells Arms point forward Beginnings of occipital and sphenoid bones Bilateral cartilaginous sternal bars tie ribs together; sternal bars join cranially to form the episternal bar in the midline Cartilage within otic capsule envelops semicircular canals and cochlear duct Cartilaginous styloid process Ear: Cartilaginous malleus, incus, and stapes (the middle ear ossicles) Ectomeninx covers lateral and dorsal surfaces of brain (laying the foundation for the flat bones of the skull) Intervertebral discs form from caudal condensed portion of sclerotomes Ischium and ilium Labiodental lamina: Inner dental lamina and outer labi gingival band Laryngeal cartilages |

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| | <input type="checkbox"/> Limbs point forward (ventrally) |
| | <input type="checkbox"/> Orbitosphenoid cartilage located within ectomeninx near optic stalk |
| | <input type="checkbox"/> Ossification begins in maxilla (stages 19 -20) |
| | <input type="checkbox"/> Primitive palate (or intermaxillary segment) |
| | <input type="checkbox"/> Rib primordia become cartilaginous |
| | <input type="checkbox"/> Ribs each have an identifiable head and shaft |
| | <input type="checkbox"/> Trachea: Tracheal cartilage |
| | <input type="checkbox"/> U-shaped labiodental lamina form along upper and lower oral cavity |
| | <input type="checkbox"/> Vertebral column represented by cartilaginous centrum, neural arch, and short tranverse process |
| | <input checked="" type="checkbox"/> Esophagus: Muscularis layer adjacent to esophageal plexus |
| | <input checked="" type="checkbox"/> Gluteal muscle group |
| | <input checked="" type="checkbox"/> Iliopsoas muscles |
| | <input checked="" type="checkbox"/> Infrahyoid muscles |
| | <input checked="" type="checkbox"/> Internal intercostal muscles |
| | <input checked="" type="checkbox"/> Limb extensor muscles located dorsally |
| | <input checked="" type="checkbox"/> Limb flexor muscles located ventrally |
| | <input checked="" type="checkbox"/> Midgut: Muscularis |
| | <input checked="" type="checkbox"/> Muscle tissue forming around phrenic nerve within septum transversum portion of diaphragm |
| | <input checked="" type="checkbox"/> Pharyngeal constrictor muscle |
| | <input checked="" type="checkbox"/> Premuscle mass of the muscles of mastication innervated by mandibular nerve |
| | <input checked="" type="checkbox"/> Quadratus lumborum muscle |
| | <input checked="" type="checkbox"/> Rhomboid and scalene muscles |
| | <input checked="" type="checkbox"/> Sternocleidomastoid and trapezius muscles distinct and innervated by separate branches of spinal accessory nerve (CN XI) |
| | <input checked="" type="checkbox"/> Thenar and hypothenar eminences |
| | <input checked="" type="checkbox"/> Tongue forms from swellings in floor of pharynx |
| | <input checked="" type="checkbox"/> Tongue: Extrinsic muscles identifiable |
| | <input checked="" type="checkbox"/> Tongue: Intrinsic muscles identifiable |
| | <input checked="" type="checkbox"/> Transversospinal and erector spinae muscle groups |
| | <input checked="" type="checkbox"/> Upper limb flexors innervated by musculocutaneous, median, and ulnar nerves |
| | <input checked="" type="checkbox"/> Major calyces, cranial and caudal, with collecting tubules within metanephrogenic mass |
| | <input checked="" type="checkbox"/> Mesonephros extends from T-9 to L-3 |
| | <input checked="" type="checkbox"/> Metanephros extends from T-12 to L-2 |
| | <input checked="" type="checkbox"/> Renal capsule covers distal collecting tubules |
| | <input checked="" type="checkbox"/> Renal vesicles form in part of metanephros |
| | <input checked="" type="checkbox"/> Ureter forms from "proximal segment of metanephric diverticulum" |
| | <input checked="" type="checkbox"/> Urogenital sinus comprised of three parts: Bladder, pelvic, and phallic portions |

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| | ■ Anal folds adjacent to anal membrane |
| | ■ Anal membrane |
| | ■ Duodenum: "Assumes the shape of an arc" |
| | ■ Greater omentum |
| | ■ Lateral palatine process |
| | ■ Liver: rapid growth, right side greater than left |
| | ■ Median mandibular groove disappears as mandibular processes merge in midline |
| | ■ Palatine fossa (from pharyngeal pouch 2) |
| | ■ Primitive oral cavity |
| | ■ Primitive rima oris replaces stomodeum |
| | ■ Stomach wall layers: Mucosa, submucosa, muscularis, and serosa |
| | ■ Submandibular and parotid gland buds |
| | ■ Submandibular gland duct |
| | ■ Bronchial tree: First generation of subsegmental bronchi complete |
| | ■ Glottis, primitive |
| | ■ Lung sac, right: Oblique and horizontal fissures define upper, lower, and middle lobes |
| | ■ Lung sac: Apex and base |
| | ■ Lung, left: Oblique fissure defines upper and lower lobes |
| | ■ "Septum primum fuses with endocardial cushions" obliterating ostium primum and creating the ostium secundum |
| | ■ Apex of left ventricle |
| | ■ Circulus arteriosus (Circle of Willis) complete |
| | ■ External iliac arteries |
| | ■ Iliac lymph sac |
| | ■ Intercostal and subcostal arteries |
| | ■ Internal thoracic artery and costocervical trunk |
| | ■ Mesenteric lymph sac |
| | ■ Mesonephric artery feeds mesonephros, gonads, and suprarenal glands |
| | ■ Papillary muscles |
| | ■ Pontine, superior cerebellar, and anterior and posterior interior cerebellar arteries replace myelencephalic and metencephalic arteries |
| | ■ Primitive marginal sinus drains diencephalon |
| | ■ Primitive tentorial sinus drains cerebral vesical |
| | ■ Primitive transverse and sigmoid sinuses |
| | ■ Pulmonary arteries (right and left) |
| | ■ Right coronary artery arises from aorta |
| | ■ Splenic vein |
| | ■ Tricuspid and mitral valves |

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| | <ul style="list-style-type: none"> Anterior chamber between iridopupillary membrane and thickened ectoderm |
| | <ul style="list-style-type: none"> Auditory tube and primitive tympanic cavity form from tubotympanic recess pharyngeal pouch 1) |
| | <ul style="list-style-type: none"> Celiac, superior mesenteric, and inferior mesenteric preaortic ganglia |
| | <ul style="list-style-type: none"> Choana |
| | <ul style="list-style-type: none"> Cochlear duct tip grows upward |
| | <ul style="list-style-type: none"> Esophageal plexus formed by vagal nerves (CN X) |
| | <ul style="list-style-type: none"> Facial nerve (CN VII) branches: Chorda tympani, greater petrosal, posterior auricular, and digastric |
| | <ul style="list-style-type: none"> Facial nerve (CN VII) reaches cervicomandibular region |
| | <ul style="list-style-type: none"> Glossopharyngeal nerve (CN IX) innervates stylopharyngeus premuscle mass |
| | <ul style="list-style-type: none"> Hypoglossal nerve (CN XII) innervates separating tongue muscles |
| | <ul style="list-style-type: none"> Linguogingival groove |
| | <ul style="list-style-type: none"> Nasolacrimal duct forms from maxillonasal groove |
| | <ul style="list-style-type: none"> Nasolacrimal ducts extend from medial eyes to primitive nasal cavity |
| | <ul style="list-style-type: none"> Nerve fibers begin extending from retina |
| | <ul style="list-style-type: none"> Optic fibers enter chiasmatic plate |
| | <ul style="list-style-type: none"> Primitive nasal cavity |
| | <ul style="list-style-type: none"> Primordial vitreous body |
| | <ul style="list-style-type: none"> Superior, middle, and inferior cervical ganglia |
| | <ul style="list-style-type: none"> Trigeminal nerve (CN V) with ophthalmic, maxillary, and mandibular divisions reach their destinations |
| | <ul style="list-style-type: none"> Vagal trunks, anterior and posterior, extending into abdomen |
| | <ul style="list-style-type: none"> Eyelids: Upper and lower lids present and growing |
| | <ul style="list-style-type: none"> Sacculle and cochlear duct |
| | <ul style="list-style-type: none"> Adenohypophysis: Lateral lobes of pars tuberalis |
| | <ul style="list-style-type: none"> Adenohypophysis: Pars intermedia emerging |
| | <ul style="list-style-type: none"> Brain: Internal capsule formation underway |
| | <ul style="list-style-type: none"> Cerebral hemispheres cover half of diencephalon |
| | <ul style="list-style-type: none"> Dorsal and ventral cochlear nuclei |
| | <ul style="list-style-type: none"> Fourth ventricle: Lateral recesses |
| | <ul style="list-style-type: none"> Ganglion of nervus terminalis |
| | <ul style="list-style-type: none"> Globus pallidus externus in the diencephalon |
| | <ul style="list-style-type: none"> Habenular commissure |
| | <ul style="list-style-type: none"> Intermediate layer in dorsal thalamus |
| | <ul style="list-style-type: none"> Lemniscal decussation |
| | <ul style="list-style-type: none"> Lower limb nerves (femoral, obturator, sciatic, common peroneal, and tibial) identifiable |
| | <ul style="list-style-type: none"> Medial accessory olivary nucleus |
| | <ul style="list-style-type: none"> Neurohypophyseal bud |
| | <ul style="list-style-type: none"> Nuclei of forebrain septum |

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| | <ul style="list-style-type: none"> Nucleus accumbens |
| | <ul style="list-style-type: none"> Occipital pole of cerebral hemispheres |
| | <ul style="list-style-type: none"> Optic stalk with barely discernible lumen |
| | <ul style="list-style-type: none"> Paraphysis marks dividing line in roof between telencephalon and diencephalon |
| | <ul style="list-style-type: none"> Primitive filum terminale |
| | <ul style="list-style-type: none"> Radial nerve innervates upper limb extensors |
| | <ul style="list-style-type: none"> Rhombomeres no longer distinguishable |
| | <ul style="list-style-type: none"> Subcommissural organ |
| | <ul style="list-style-type: none"> Zona limitans intrathalamica between dorsal and ventral thalami |
| 6 weeks, 6 days $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Feet polygon-shaped |
| | <ul style="list-style-type: none"> Cloacal membrane ruptures |
| 7 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Head rotates |
| | <ul style="list-style-type: none"> Leg movements |
| | <ul style="list-style-type: none"> B lymphocytes in liver |
| | <ul style="list-style-type: none"> Ovaries |
| | <ul style="list-style-type: none"> Testes begin to differentiate |
| | <ul style="list-style-type: none"> Insulin in pancreas |
| | <ul style="list-style-type: none"> Foot plates notched |
| | <ul style="list-style-type: none"> Hiccups |
| | <ul style="list-style-type: none"> Tendons attach muscle to bone |
| | <ul style="list-style-type: none"> The heart has four chambers and is nearly complete. |
| | <ul style="list-style-type: none"> The heart rate peaks at 165 to 170 beats per minute. |
| | <ul style="list-style-type: none"> Crown-heel length 2.2 cm |
| Unit 8: 7 to 8 Weeks | |
| 7 weeks, 1 day $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Facial processes no longer distinguishable |
| | <ul style="list-style-type: none"> Ovaries full of primitive oogonia, intermediate pregranulosa cells, and mesenchyme |
| | <ul style="list-style-type: none"> Testes with short straight tubules |
| | <ul style="list-style-type: none"> Upper limbs with slightly flexed elbows |
| | <ul style="list-style-type: none"> Diaphragm: Central tendon |
| | <ul style="list-style-type: none"> Renal vesicles with S-shaped lumina |
| | <ul style="list-style-type: none"> Submandibular gland: Solid epithelial ducts enlarge and begin to branch |
| | <ul style="list-style-type: none"> Adenohypophysis with new capillaries on rostral surface |
| | <ul style="list-style-type: none"> Scalp vascular plexus |
| | <ul style="list-style-type: none"> Cochlear duct tip growing horizontally |
| | <ul style="list-style-type: none"> Lens cavity completely filled |
| | <ul style="list-style-type: none"> Optic commissure |

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| | <ul style="list-style-type: none"> Optic fibers extend to optic chiasma Cornea with three layers |
| | <ul style="list-style-type: none"> Brain: Inferior colliculus (in mesencephalon) |
| | <ul style="list-style-type: none"> Cerebral hemispheres expand beyond lamina terminalis |
| | <ul style="list-style-type: none"> Cerebral hemispheres extend over two-thirds of diencephalon |
| | <ul style="list-style-type: none"> Interpeduncular groove |
| | <ul style="list-style-type: none"> Medial septal nucleus |
| | <ul style="list-style-type: none"> Nigrostriatal fibers |
| | <ul style="list-style-type: none"> Nucleus of diagonal band |
| | <ul style="list-style-type: none"> Sacrocaudal spinal cord formation (secondary neurulation) complete |
| | <ul style="list-style-type: none"> Sensory pathways: Cuneate and gracile decussating fibers |
| | <ul style="list-style-type: none"> Septum verum Spinthalamic tract |
| 7 weeks, 1 day - 8 weeks ½ ½ | <ul style="list-style-type: none"> Stomach: Folds in stomach wall |
| 7 weeks, 2 days ½ ½ | <ul style="list-style-type: none"> Arteries and veins of heart complete |
| 7 weeks, 3 days ½ ½ | <ul style="list-style-type: none"> Volar pads begin to emerge on fingertips |
| | <ul style="list-style-type: none"> Chondrocranium with dorsum sellae and hypophysial fossa |
| | <ul style="list-style-type: none"> Dens (of second cervical vertebrae) |
| | <ul style="list-style-type: none"> Sternoclavicular joint and manubrium |
| | <ul style="list-style-type: none"> The knee joints have arrived |
| | <ul style="list-style-type: none"> Trachea: Thyroid cartilage |
| | <ul style="list-style-type: none"> Wrists slightly flexed |
| | <ul style="list-style-type: none"> Gluteus medius and gluteus minimus muscles |
| | <ul style="list-style-type: none"> Iliacus muscles |
| | <ul style="list-style-type: none"> Mylohyoid and infrahyoid muscles |
| | <ul style="list-style-type: none"> Orbicularis oculi muscles |
| | <ul style="list-style-type: none"> Submandibular gland: Solid ducts with definitive branches |
| | <ul style="list-style-type: none"> Anterior and posterior choroid arteries |
| | <ul style="list-style-type: none"> Left superior vena cava disappears (Stages 21-23) |
| | <ul style="list-style-type: none"> Scalp vascular plexus moving toward vertex |
| | <ul style="list-style-type: none"> Cornea: Substantia propria layer |
| | <ul style="list-style-type: none"> Fibers of optic nerve reach brain |
| | <ul style="list-style-type: none"> Eyelids growing rapidly |
| | <ul style="list-style-type: none"> Anterior and inferior horns of lateral ventricle |
| | <ul style="list-style-type: none"> Brain: Insula within cerebral hemisphere |
| | <ul style="list-style-type: none"> C-shaped lateral ventricle |


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| | <ul style="list-style-type: none"> Cerebral hemispheres cover 75% of diencephalon |
| | <ul style="list-style-type: none"> Cerebral hemispheres cover more than half of diencephalon |
| | <ul style="list-style-type: none"> Cortical plate within primordial plexiform layer |
| | <ul style="list-style-type: none"> Glial and neurilemmal (Schwann) cells within cranial nerves |
| | <ul style="list-style-type: none"> Global pallidus internus |
| | <ul style="list-style-type: none"> Internal fiber layer of cerebellum |
| | <ul style="list-style-type: none"> Lateral olfactory tract |
| | <ul style="list-style-type: none"> Primordium of dentate nucleus |
| | <ul style="list-style-type: none"> Pyramidal cells in hippocampus |
| | <ul style="list-style-type: none"> Subthalamic nucleus proper, entopeduncular nucleus, and globus pallidus externus within subthalamus |
| | <ul style="list-style-type: none"> Sulcus transversus rhombencephali |
| | <ul style="list-style-type: none"> Ventral part of lateral geniculate body |
| 7½ weeks | <ul style="list-style-type: none"> Hands begin to touch face |
| | <ul style="list-style-type: none"> The hands touch each other as do the feet! |
| | <ul style="list-style-type: none"> Fingertips thicken |
| | <ul style="list-style-type: none"> Plantar pads toes |
| | <ul style="list-style-type: none"> EKG pattern similar to adult |
| 7 weeks, 4 days | <ul style="list-style-type: none"> The fingers are free |
| 7 weeks, 5 days | <ul style="list-style-type: none"> Bone-forming cells called osteoblasts emerge |
| | <ul style="list-style-type: none"> Bone-forming cells emerge |
| | <ul style="list-style-type: none"> Endolymphatic and jugular foramina |
| | <ul style="list-style-type: none"> Hands can reach one another and fingers can overlap |
| | <ul style="list-style-type: none"> Optic foramen, foramen rotundum, internal acoustic foramen |
| | <ul style="list-style-type: none"> Osteoblasts emerge |
| | <ul style="list-style-type: none"> Pelvis: Obturator foramen |
| | <ul style="list-style-type: none"> Obturator internus muscles |
| | <ul style="list-style-type: none"> Rectus femoris muscle |
| | <ul style="list-style-type: none"> Large glomeruli present within metanephros |
| | <ul style="list-style-type: none"> Submandibular gland: Secondary branching with lumen formation starting at oral end of duct |
| | <ul style="list-style-type: none"> Costodiaphragmatic recess of pleural cavity |
| | <ul style="list-style-type: none"> Chordae tendineae (Stages 22 and 23) |
| | <ul style="list-style-type: none"> Intradural veins (sinuses) |
| | <ul style="list-style-type: none"> Scalp vascular plexus 75% of the way to the vertex |
| | <ul style="list-style-type: none"> Cochlear duct's second loop growing upward |
| | <ul style="list-style-type: none"> Scleral condensation |
| | <ul style="list-style-type: none"> Tragus and antitragus taking shape |


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| | <ul style="list-style-type: none"> Yellow box: Eyelids continue growing rapidly over the surface of the cornea |
| | <ul style="list-style-type: none"> Yellow box: Optic nerve acquires a sheath |
| | <ul style="list-style-type: none"> Blue box: Brain: Claustrum |
| | <ul style="list-style-type: none"> Blue box: Brain: Cortical plate within cerebral hemispheres |
| | <ul style="list-style-type: none"> Blue box: Brain: Internal capsule with connections to epithalamus, dorsal thalamus, and mesencephalon |
| | <ul style="list-style-type: none"> Blue box: Brain: Putamen |
| | <ul style="list-style-type: none"> Blue box: Cerebral hemispheres cover 75% of diencephalon |
| | <ul style="list-style-type: none"> Blue box: Commissural plate thickens |
| | <ul style="list-style-type: none"> Blue box: Cortical plate expanding rapidly |
| | <ul style="list-style-type: none"> Blue box: Folds in roof of third ventricle |
| | <ul style="list-style-type: none"> Blue box: Nerve fibers between neopallial subplate and internal capsule |
| | <ul style="list-style-type: none"> Blue box: Thalamocortical fibers |
| 7 weeks, 6 days $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Grey box: The toes are free |
| 8 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Green box: Complex response to touch |
| | <ul style="list-style-type: none"> Green box: More frequent hand-to-face contact |
| | <ul style="list-style-type: none"> Green box: Mouth opens & closes |
| | <ul style="list-style-type: none"> Green box: Squinting |
| | <ul style="list-style-type: none"> Green box: The embryo floats and rolls over in the womb |
| | <ul style="list-style-type: none"> Pink box: Hairs first appear in eyebrows & around mouth |
| | <ul style="list-style-type: none"> Pink box: Skin multi-layered, loses transparency |
| | <ul style="list-style-type: none"> Light green box: Ductus deferens |
| | <ul style="list-style-type: none"> Light green box: Interstitial cells forming within testis |
| | <ul style="list-style-type: none"> Light green box: Testicular tubules |
| | <ul style="list-style-type: none"> Cyan box: Male embryos are making testosterone already! |
| | <ul style="list-style-type: none"> Grey box: Anterior inferior iliac spine |
| | <ul style="list-style-type: none"> Grey box: Costal cartilage |
| | <ul style="list-style-type: none"> Grey box: Enamel organ |
| | <ul style="list-style-type: none"> Grey box: Femur: Head and acetabular fossa |
| | <ul style="list-style-type: none"> Grey box: Glenoid fossa |
| | <ul style="list-style-type: none"> Grey box: Greater trochanter |
| | <ul style="list-style-type: none"> Grey box: Head of humerus |
| | <ul style="list-style-type: none"> Grey box: Inguinal ligament |
| | <ul style="list-style-type: none"> Grey box: Joint development: Cavitation underway in hip, knee, and ankle (in some embryos) |
| | <ul style="list-style-type: none"> Grey box: Joint development: Cavitation underway in shoulder, elbow, and wrist (in some embryos) |
| | <ul style="list-style-type: none"> Grey box: Nucleus pulposus (from notochord) |
| | <ul style="list-style-type: none"> Grey box: Ossification underway in scapula and distal phalanges in some embryos |
| | <ul style="list-style-type: none"> Grey box: Pubic symphysis |

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| | <input type="checkbox"/> Scapular spine and notch |
| | <input type="checkbox"/> Skull: Foramen magnum (wide) |
| | <input type="checkbox"/> Skull: Ossification underway in some embryos |
| | <input type="checkbox"/> Superior and inferior pubic rami |
| | <input type="checkbox"/> The embryo's joints are similar to adult joints |
| | <input type="checkbox"/> Ulna: Styloid process and olecranon |
| | <input type="checkbox"/> Vertebrae cartilaginous (33 or 34 in number) |
| | <input checked="" type="checkbox"/> Anterior digastric muscles |
| | <input checked="" type="checkbox"/> Depressor anguli oris muscle |
| | <input checked="" type="checkbox"/> Diaphragm complete |
| | <input checked="" type="checkbox"/> Esophagus: Longitudinal muscles |
| | <input checked="" type="checkbox"/> Obliquus superior capitus muscle |
| | <input checked="" type="checkbox"/> Obturator externus, gluteus maximus, and hamstring muscles |
| | <input checked="" type="checkbox"/> Posterior belly of the digastric muscle |
| | <input checked="" type="checkbox"/> Psoas tendon |
| | <input checked="" type="checkbox"/> Rectus sheath with anterior and posterior lamina |
| | <input checked="" type="checkbox"/> Temporal and lateral pterygoid muscles |
| | <input checked="" type="checkbox"/> Zygomaticus major muscle |
| | <input checked="" type="checkbox"/> Kidneys at level of first three lumbar vertebrae |
| | <input checked="" type="checkbox"/> Metanephros: Numerous large glomeruli |
| | <input checked="" type="checkbox"/> Metanephros: Secretory tubules elongating and becoming convoluted |
| | <input checked="" type="checkbox"/> Sinusal tubercle |
| | <input checked="" type="checkbox"/> Urethra |
| | <input checked="" type="checkbox"/> Urine production and release |
| | <input checked="" type="checkbox"/> Gastrosplenic ligament |
| | <input checked="" type="checkbox"/> Nerves reaching intestinal loop |
| | <input checked="" type="checkbox"/> Peristalsis in large intestine |
| | <input checked="" type="checkbox"/> Submandibular gland: Lumen present in terminal portions of duct |
| | <input checked="" type="checkbox"/> Submandibular gland: Mesodermal sheath surrounds gland |
| | <input checked="" type="checkbox"/> Unfused uvula (edge of unfused palatine shelf) and secondary palate |
| | <input checked="" type="checkbox"/> Occasional breathing motions begin |
| | <input checked="" type="checkbox"/> Pseudoglandular stage begins |
| | <input checked="" type="checkbox"/> Azygos vein |
| | <input checked="" type="checkbox"/> Blood supply to the brain closely resembles adult pattern |
| | <input checked="" type="checkbox"/> Hemiazygos veins |
| | <input checked="" type="checkbox"/> Inferior epigastric artery |
| | <input checked="" type="checkbox"/> Inferior vena cava valve at junction of right atrium |
| | <input checked="" type="checkbox"/> Scalp vascular plexus nearing vertex |
| | <input checked="" type="checkbox"/> Submandibular glands: Angiogenesis begins around epithelial tree (ducts) |


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| | <input checked="" type="checkbox"/> Superior sagittal sinus |
| | <input checked="" type="checkbox"/> Cochlear duct's 2.5 coils nearly complete |
| | <input checked="" type="checkbox"/> Cranial nerve distribution mimics adult pattern |
| | <input checked="" type="checkbox"/> Ear drum |
| | <input checked="" type="checkbox"/> Eye: Secondary vitreous body |
| | <input checked="" type="checkbox"/> Lens: Secondary lens fibers emerging |
| | <input checked="" type="checkbox"/> Retina: Eight layers present |
| | <input checked="" type="checkbox"/> Retina: Four of the ten adult layers present |
| | <input checked="" type="checkbox"/> Tympanic membrane |
| | <input checked="" type="checkbox"/> Eyelids fusing laterally and medially |
| | <input checked="" type="checkbox"/> Optic tract reaches ventral portion of lateral geniculate body |
| | <input checked="" type="checkbox"/> "The hindbrain "presents striking resemblance to that of the newborn." |
| | <input checked="" type="checkbox"/> "The rhombencephalon...presents striking resemblance to that of the newborn." |
| | <input checked="" type="checkbox"/> Amygdala area |
| | <input checked="" type="checkbox"/> Brain represents 43% of embryo |
| | <input checked="" type="checkbox"/> Brain: Caudate nucleus and putamen within corpus striatum |
| | <input checked="" type="checkbox"/> Cerebellar commissures |
| | <input checked="" type="checkbox"/> Cerebellum with external germinal layer |
| | <input checked="" type="checkbox"/> Cerebral hemispheres cover lateral portion of diencephalon |
| | <input checked="" type="checkbox"/> Choroid plexus now lobular |
| | <input checked="" type="checkbox"/> Cortical plate covers nearly all of neopallial surface |
| | <input checked="" type="checkbox"/> Dura lines entire vertebral canal |
| | <input checked="" type="checkbox"/> Fasciculus cuneatus and fasciculus gracilis form the decussation of the medial lemnisci |
| | <input checked="" type="checkbox"/> Greater palatine nerve |
| | <input checked="" type="checkbox"/> Grey and white matter |
| | <input checked="" type="checkbox"/> Hippocampus reaches temporal pole |
| | <input checked="" type="checkbox"/> Inferior and superior cerebellar peduncles |
| | <input checked="" type="checkbox"/> Most cisterns present |
| | <input checked="" type="checkbox"/> Principal nucleus of inferior olivary nuclei |
| | <input checked="" type="checkbox"/> Pyramidal decussations |
| | <input checked="" type="checkbox"/> Right- and left-handedness emerges |
| | <input checked="" type="checkbox"/> Suprapineal recess |
| | <input checked="" type="checkbox"/> Suprascapular nerve |
| | <input checked="" type="checkbox"/> Vermis of cerebellum |
| | <input type="checkbox"/> Crown-heel length 4.3 cm |
| | <input type="checkbox"/> Embryo contains approximately 1 billion (10^9) cells |
| | <input type="checkbox"/> Embryonic Period Ends |
| | <input type="checkbox"/> The 8-week embryo has formed more than 4,000 permanent body parts. |


Unit 9: 8 to 9 Weeks


8 weeks, 1 day $\frac{1}{2}$ $\frac{1}{2}$  Humerus: Bone marrow replaces cartilage


8 weeks, 1 day - 9 weeks $\frac{1}{2}$ $\frac{1}{2}$  Anal canal patent


8 $\frac{1}{2}$ weeks $\frac{1}{2}$ $\frac{1}{2}$  Eyelids completely fused


 Neurons synapse in cerebral cortex (marginal zone)


9 weeks $\frac{1}{2}$ $\frac{1}{2}$  Bends hip & knee if sole of foot touched


 Drinking fluid is becoming routine

 Sucking the thumb

 The young fetus now sighs, stretches, moves the head, opens the mouth, and moves the tongue


 Tongue movement


 Female fetuses have early reproductive cells in their ovaries

 Thyroid gland weighs 2 grams


 Small intestine peristalsis

 External capsule


 Face, hands, and feet sense light touch


 Olivary nucleus with five components

Unit 10: 9 to 10 Weeks


9 weeks - 10 weeks $\frac{1}{2}$ $\frac{1}{2}$  Early vocal cords

 Larynx recanalizes

 My weight will rise more than 75% this week

9 $\frac{1}{2}$ weeks $\frac{1}{2}$ $\frac{1}{2}$  I yawn when I want


9 weeks, 4 days $\frac{1}{2}$ $\frac{1}{2}$  Yawns

10 weeks $\frac{1}{2}$ $\frac{1}{2}$  Eyes roll downward reflexively


 Palatine tonsils


 Fingernails and toenails begin to grow!


 Three-layered epidermis

 Tiny unique fingerprints have arrived!

 Now, all the bones are getting harder

 Tooth buds (secondary teeth)

 Glomeruli formation begins

 Physiologic herniation ends

| | |
|--|---|
| | <ul style="list-style-type: none"> ■ Commissure of the fornix ■ Corpus callosum begins Crown-heel length 7.5 cm |
|--|---|

Unit 11: 10 to 11 Weeks

| | |
|---|---|
| 10 weeks - 12 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> ■ Langerhans cells enter epidermis |
|---|---|

| | |
|---|---|
| 10½ weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Volar and plantar pads regress |
|---|---|

| | |
|--|---|
| 11 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> ■ The face now makes complex expressions |
|--|---|

| | |
|--|--|
| | <ul style="list-style-type: none"> ■ Immunological competence Intermediate layer Nose & lips completely formed ■ Now you can tell if your baby is a girl or a boy! Thyroid gland weighs 12 grams ■ Intestines absorb water & glucose ■ Small intestine lined with villi Auditory cells: inner & outer hair cells Crown-heel length |
|--|--|

Unit 12: 11 to 12 Weeks

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|---|--|
| 11 weeks - 12 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Weight increases by 60% this week |
|---|--|

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| 12 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> ■ Hands touch the mouth up to 50 times per hour |
|--|--|

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|--|---|
| | <ul style="list-style-type: none"> ■ T lymphocytes leave thymus Sebaceous glands Many different hormones are present in pituitary gland Thyroid gland produces hormone Palate fuses Upper limbs reach final proportion ■ All facial muscles in final positions ■ Bladder resembles smooth muscle ■ Bowel movements ■ Liver: Bile production begins There are taste buds all over the mouth ■ Corpus callosum ■ Crura cerebri ■ Myelination in spinal cord Crown-heel length 12 cm Head circumference 10 cm |
|--|---|

Unit 13: 3 to 4 Months

| | |
|--|--|
| 13 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Teeth are growing Cilia lining airways Most of body sensitive to touch |
| 14 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Crown-heel length 15 cm Girls move their jaws more than the boys do Light touch to mouth evokes turn toward stimulus 4-lobed cerebral cortex Cerebellum resembles adult structure Crown-heel length 17 cm Fat deposits in cheeks |
| 15 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Stem cells arrive in bone marrow Body fat emerges throughout the body Glucagon in fetal bloodstream Digestive enzymes Crown-heel length 19.5 cm |
| 16 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Quickening Fat deposits upper & lower limbs Tooth enamel Colon lined with villi Bronchial tree nearly complete Canalicular stage begins Hormonal stress response to invasive procedures Crown-heel length 21 cm |
| Unit 14: 4 to 5 Months | |
| 17 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Retina has discrete layers |
| 18 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Apocrine sweat glands Cream-like substance protects skin Sweat glands Insulin secretion Speaking motion of larynx Corpus callosum complete |
| 19 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Melanin production Number of oogonia peak (at about 7 million) within fetal ovaries |


| | |
|--------------------------------------|--|
| | <ul style="list-style-type: none"> Daily cycles in biological rhythms Sulci on surface of cerebral hemispheres |
| 20 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> All skin layers and structures Peyer's patches Surfactant production (low levels) Hearing and responding to sound begins Hearing and responding to sound begins Crown-heel length 28 cm Head circumference 20 cm |


Unit 15: 5 to 6 Months

| | |
|---|---|
| 20 weeks - 24 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Eyelids separate, eyes open and close |
| 21 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Periderm disappears Stratum corneum |
| 21 weeks - 22 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> If born prematurely from this point on, survival is possible |
| 22 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Cornea structure Behavioral states |
| 23 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Brain weight 100 grams |
| 24 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Blink-startle response; females before males Crown-heel length 34.5 cm |

Unit 16: 6 to 7 Months


| | |
|---|---|
| 25 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Intestinal lining contains all adult cell types Rods & cones The ability to taste |
| 26 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Additional fat deposits decrease wrinkles Tear production Terminal sac stage begins The ability to smell has arrived |
| 26 weeks - 38 weeks $\frac{1}{2}$ $\frac{1}{2}$ | <ul style="list-style-type: none"> Brain weight increases 400% to 500% |


27 weeks $\frac{1}{2}$ $\frac{1}{2}$  Pupils react to light


28 weeks $\frac{1}{2}$ $\frac{1}{2}$  Distinguishes sounds of different frequencies


 Crown-heel length 39.5 cm


Unit 17: 7 to 8 Months


30 weeks $\frac{1}{2}$ $\frac{1}{2}$  Breathing motions are common even though there is no air in the womb


 6-layered cerebral cortex


 Head circumference 30 cm

32 weeks $\frac{1}{2}$ $\frac{1}{2}$  Esophagus: Lower esophagus muscles functional


 Glomeruli formation complete


 Alveoli


 Memory - music preferences


 Crown-heel length 45 cm


Unit 18: 8 to 9 Months

32 weeks - 36 weeks $\frac{1}{2}$ $\frac{1}{2}$  Prenatal food affects newborn taste preferences

34 weeks $\frac{1}{2}$ $\frac{1}{2}$  Rapid weight gain

35 weeks $\frac{1}{2}$ $\frac{1}{2}$  Firm grip


 Amniotic fluid volume peaks


36 weeks $\frac{1}{2}$ $\frac{1}{2}$  Surfactant production accelerates


 Brain weight 300 grams


 Crown-heel length 48.5 cm


Unit 19: 9 Months to Birth


37 weeks $\frac{1}{2}$ $\frac{1}{2}$  Fetus drinks an estimated 15 oz (or 450cc) of amniotic fluid/day

38 weeks $\frac{1}{2}$ $\frac{1}{2}$  Air breathing begins

 By term, the typical umbilical cord measures 20 to 24 inches (50 to 60 cm)

 Heart beats 54 million times before birth

 Major circulatory changes

 Spinal cord ends at third lumbar vertebrae

 Brain weight 350 grams

